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THE FIRST PROJAPYGIDAE FROM WESTERN AUSTRALIA, WITH SOME ADDITIONAL NOTES ON THE FAMILY AND ITS ALLIES

By G. F. BORNEMISSZA,* Department of Zoology, University of Western Australia.

During my survey of the soil fauna of the Kimberley Division in February, 1954, one specimen of the family Projapygidae was extracted from a soil sample collected on the bank of the Ord River opposite Ivanhoe Station. This specimen, identified as *Symphylurinus* sp. nov., constitutes the first record of the family from Western Australia and the second record from Australia.

The Projapygidae have a world-wide distribution; the genus *Symphylurinus* is known from China, India, West Africa and Brazil. The first representative (*Symphylurinus swani* Wom.) of this family from Australia was collected as recently as 1945 by Mr. D. C. Swan at Atherton, north Queensland (Womersley, 1945).

The family, established by Cook in 1896, was founded on specimens (*Projapyx stylifer* Cook) collected from humus in a tropical rain forest in Liberia. The phylogenetic significance of the family, with its suggestive similarities to the Symphyla as well as to the Campodeidae and the Japygidae, was quickly realised, particularly by Silvestri (1901). Verhoeff (1903) questioned the validity of the new family, considering the described species to be no more than juvenile forms of certain japygids. By examining several specimens Silvestri (1905) produced ample evidence to justify its retention. The Projapygidae is now accepted by all entomologists.

At the beginning of the century the Projapygidae was placed in the order Thysanura, together with the silver fish (family Lepis-

* Present address: C.S.I.R.O., Division of Entomology, Canberra, A.C.T.

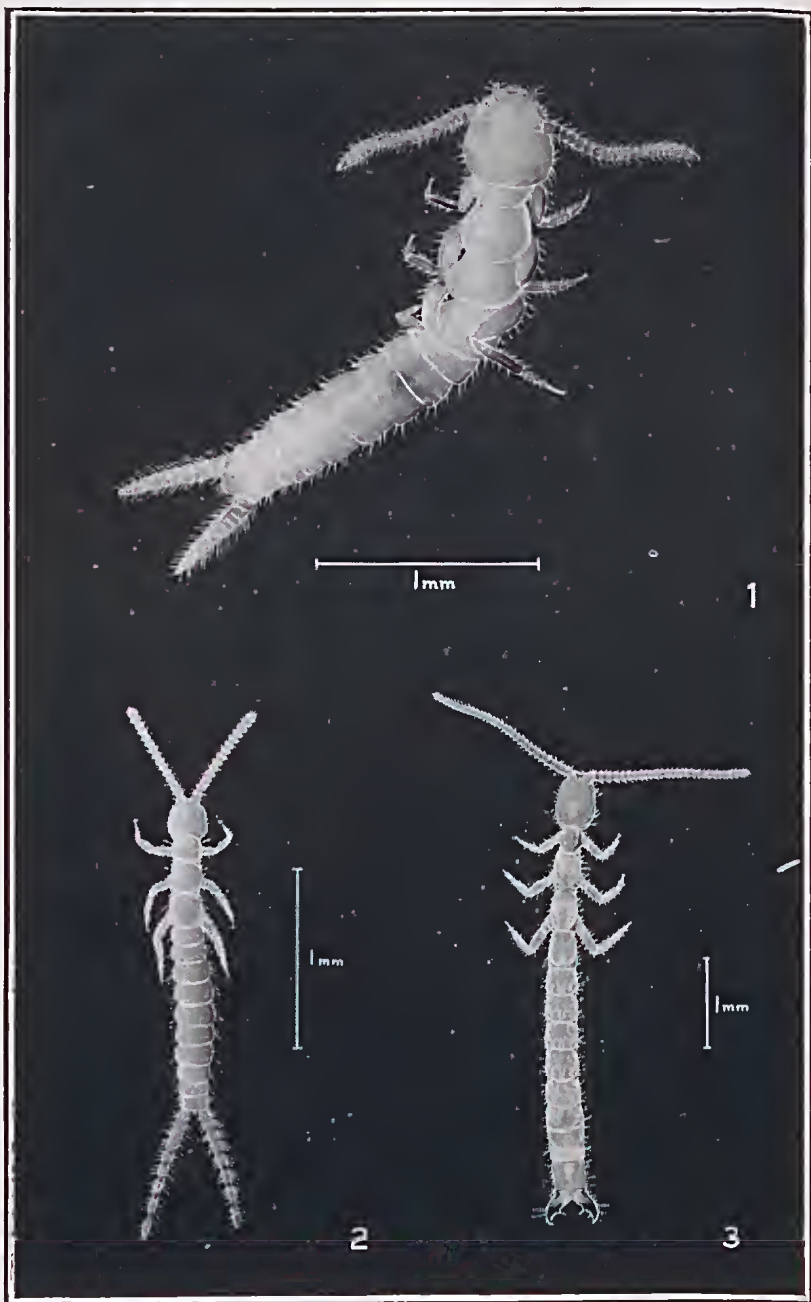
matidae) and the bristle tails (family Maehilidae). However, present day taxonomists place it, with the Japygidae and Campodeidae, in a separate order, the Diplura. Figures 1-3* and Table 1 illustrate the close relationship between the three families, with the projapygids forming a clearly defined link between the campodeids and the japygids although more closely related to the former than to the latter. The Projapygidae might perhaps have been more appropriately named by Cook the "Metacampodeidae." His probable reason for selecting the former name is suggested by his statement that: "The habits and movements are so exactly those of Japyx that the first specimen was pursued as an early stage of that form."

TABLE 1.—THE RELATIONSHIP OF THE PROJAPYGIDAE TO OTHER FAMILIES OF THE ORDER DIPLURA

Morphological Characters		
Fam. Campodeidae	Fam. Projapygidae	Fam. Japygidae
1 Cerci multisegmented	1 Cerci multisegmented	1 Cerci unsegmented
2 Cerci compact	2 Cerci tubular, connected to a pair of abdominal glands	2 Cerci compact
3 Cerci unarmed	3 Cerci sometimes armed with chitinized dentition in males only (e.g. <i>Symphylurinus arlei</i> Wyg.)	3 Cerci always armed in both sexes, strongly chitinized, pincers-like
4 Anal plates distinguishable	4 Anal plates distinguishable	4 Anal plates obscure
5 Dentate plate on maxillae present	5 Dentate plate on maxillae present	5 Maxillae simple
6 Fore-gut terminating well beyond the thorax	6 Fore-gut terminating at abdominal segment V	6 Fore-gut terminating just behind the thorax
7 Malpighian tubes present as papillae	7 Malpighian tubes present, 5-6	7 Malpighian tubes absent
Ecological Characters		
8 Scavengers or predators	8 Scavengers	8 Predators
9 Definite preference for fine textured (below 0.3 mm. median diam.) soils	9 Definite preference for fine textured (below 0.2 mm. median diam.) soils	9 Preference for finer textured, but also well represented in coarser (0.3-0.6 mm. median diam.) soils

Apart from anatomical and morphological characters, little is known about this family. Mature specimens measure from 2 to 3.5 mm. in body length. They are very delicate, white or slightly cream-coloured insects, completely blind and spend their whole existence in humus or under logs or stones. Their small size and avoidance of light make observations on their behaviour extremely difficult. Judging from the very few individuals that have ever been

* The specimens were photographed in alcohol. The details of segmentation and vestiture were outlined in white on a print (magnification: 100x) and temporarily masked with rubber cement and mounting tissue while the background was sprayed with process black.



DIPLURA AS SEEN UNDER LOW MAGNIFICATION

Fig. 1.—*Symphylurinus* sp. nov. (Projapygidae) from the Kimberley Division. Fig. 2.—*Campodella* sp. nov. (Campodeidae) from the Stirling Range. Fig. 3.—*Parajapyx* sp. nov. (Japygidae) from the Kimberley Division. All species are being described by Mr. H. Womersley.

taken in any one locality, the projapygids are some of the rarest of all insects.

The author wishes to thank Mr. H. Womersley (South Australian Museum) for identifying the specimens illustrated and Messrs. D. H. Wilson and L. A. Marshall (Division of Entomology, C.S.I.R.O., Canberra) for photographic and process work.

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FIRST RECORD OF A PETALURID DRAGONFLY FROM WESTERN AUSTRALIA

By J. A. L. WATSON, Department of Zoology, University of Western Australia.

The dragonflies of the family Petaluridae form a primitive, distinct, and at the present time, relict group of Odonata. Plentiful and apparently dominant in Jurassic times, the family has dwindled until now only nine living species are known. Eight of these, with a scattered distribution, have been described: *Petalura gigantea* Leach; *P. ingentissima* Tillyard, and *P. pulcherrima* Tillyard, all from eastern Australia; *Uropctala carovei* (White), from New Zealand; *Phencs raptor* Rambur, from Chile; *Tachopteryx thorcyi* (Hagen), from eastern U.S.A.; *Tanypteryx hageni* (Selys), from Western U.S.A. and Canada, and *T. pryeri* (Selys), from Japan.

It is, therefore, of great interest to report the capture of a hitherto undescribed petalurid at Lesmurdie, 12 miles south-east of Perth, by Miss M. Hawkin in October, 1956. Unfortunately only a single specimen, a male, was obtained. It comes closest to the descriptions of *P. gigantea* (see Tillyard, 1908; Fraser, 1933) differing only in details of thoracic and abdominal coloration and in the shape of the appendages.

Petalurids are readily recognizable in the field by several characteristics:

- i. Their large size. The specimen from Lesmurdie is $3\frac{1}{2}$ in. long and $4\frac{1}{2}$ in. across the wings, distinctly greater in size than the common large dragonfly, *Anax papuensis* (Burm-eister).
- ii. The eyes are separated, i.e., do not meet in the mid-line.
- iii. The pterostigma (dark spot near the wingtip) is very long and narrow.
- iv. In the male, the terminal appendages are large and leaf-like, unlike those of any other Odonata. Further, the hind-wings are strongly angulated at the base.
- v. The known petalurid larvae are semi-aquatic, living in burrows in peaty swamps and spring bogs. When mature, they are 1 $\frac{3}{4}$ -2 in. long, and climb from their burrows on to reeds, on which they emerge. The most likely breeding places of the new species would appear to be the swampy headwaters of the smaller streams flowing through the Darling scarp, the type of locality in which Quokkas were recently rediscovered (Barker *et al.*, 1957). Tillyard (1908) showed that *Petalura gigantea* was common only near its breeding sites, and that there was little tendency for the adults to disperse. Similar behaviour may reasonably be expected from the western form, so that in localities where



Petalura sp., from Lesmurdie; 9/10 nat. size.

numbers of adults are observed, a search should be made for exuviae.

A full description of this new species will be published later. Meanwhile, any specimens or sight records would be of great value to the author.

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FROM FIELD AND STUDY

Diamond Dove Near Woodanilling.—Additional to the records of the Diamond Dove (*Geopelia cuneata*) recently reported from the South-west (*W.A. Nat.*, 6 (1): 24), early in February, 1957, I saw one bird seven miles east of Woodanilling.

—V. F. McDOUGALL, Nyabing.

A Further Record of *Pseudemydura umbrina*.—Another specimen of the rare Swan River tortoise, *Pseudemydura umbrina* (*W. Austr. Nat.*, 4: 125; 5: 44) has been received at the Western Australian Museum. It was found in a drain at the side of a road at Upper Swan by Ted Exell on August 30, 1956.—L. GLAUERT, W.A. Museum.

A Bandicoot New to Western Australia.—Early in July, 1957, Mr. V. N. Serventy presented two bandicoots, a male and a female, which had been collected at Christmas Island in the Archipelago of the Recherche. These two animals prove to be almost identical in all their characters with the *Isoodon nauticus* from Franklin Island in the Nuyts Archipelago, South Australia. This is an island representative of the widespread mainland *Isoodon obesulus* (the Quenda) and is recognised as a subspecies only by Tate.—L. GLAUERT, W.A. Museum.

A New Fresh-water Fish for Australia.—Mr. L. Koch, of the Entomological Branch of the Department of Agriculture, while stationed at the Kimberley Research Station, Ord River, East Kimberley, collected a small series of natural history specimens among which were four small fresh-water soles new to the Museum collection. They were forwarded to Mr. G. P. Whitley, the Curator of Fishes at the Australian Museum, Sydney, for examination. In due course Mr. Whitley replied stating that the fish belonged to the species *Liachirus klunzingeri*, inhabiting rivers of southern New Guinea but not previously reported from Australian waters. Two specimens, P4050 and 4051 were retained, the others are in the Australian Museum.—L. GLAUERT, W.A. Museum.